

Abstract Submitted  
for the DPP12 Meeting of  
The American Physical Society

**Resolving the Physics of Error Field Correction Through Error Field Proxy Experiments in DIII-D**<sup>1</sup> R.J. BUTTERY, N.M. FERRARO, R.J. LA HAYE, M.J. SCHAFFER, E.J. STRAIT, General Atomics, J.M. HANSON, Columbia University, J.-K. PARK, Princeton Plasma Physics Laboratory, H. REIMERDES, Ecole Polytechnique Federale de Lausanne — Recent studies have determined the scale and likely origins of limitations to error field correction by using DIII-D's multiple coil arrays to apply known large amplitude proxy error fields and attempting correction with additional coils of different structure. It was found that even with pure  $n = 1$  proxy fields and carefully optimized correction field, the benefits of correction were substantially limited, at the  $\sim 50\%$  level in terms of low density access. This indicates coupling of residual fields either through higher order resonances and/or through non-resonant braking of the plasma. The interpretation is confirmed by modeling with the IPEC code, which shows that the correction process reduces resonant components, but increases non-resonant NTV damping, thus decreasing rotation and easing penetration of residual resonant fields. The result is significant, suggesting multiple field components must be compensated to achieve good correction, and that the best approach may be to minimize the total field in the plasma by cancelling error fields close to their source or close to the plasma.

<sup>1</sup>This work is supported by US DOE Grant DE-FC02-04ER54698, DE-FG02-04ER54761 DE-AC02-09CH11466

Richard Buttery  
General Atomics

Date submitted: 23 Jul 2012

Electronic form version 1.4